

**EDGEWOOD CHEMICAL BIOLOGICAL CENTER
BROAD AGENCY ANNOUNCEMENT (BAA)
BAA ECBC-15
July 2015**

1.0 ADMINISTRATIVE

**Synopsis of Proposed
Contract Action:**

A notice will be posted to <http://www.fedbizopps.com>
(Classification A, Research & Development).

The applicable North American Industry Classification System (NAICS) code is 541710. The Standard Industrial Classification (SIC) code is 8731. The small business standard is 500 employees. If the offeror feels a different NAICS or SIC code applies, the contractual point of contact specified below shall be notified as soon as possible.

Solicitation:

BAA ECBC-15 (<http://www.ecbc.army.mil/about/baa.html>)

Validity Period:

This announcement is open and effective until canceled. However, it may be subject to periodic updates. Amendments will be posted on <http://www.ecbc.army.mil/about/baa.html>. Therefore, prospective offerors should occasionally refer back to this web site for updates.

Concept Papers:

Concept papers are sought from all responsible sources (colleges and universities, nonprofit research institutes, foreign organizations, and commercial firms (including small businesses, HUBZone small businesses, minority businesses, and women owned businesses). Proposals from government facilities and organizations will be considered under this announcement.

Offerors are encouraged to submit concept papers early in the government fiscal year to maximize the potential for award. Concept papers submitted late in the fiscal year (after 30 June) will be considered, but funding and award lead time may not be sufficient to issue a contract. For a concept paper which did not result in a contract in the fiscal year it was submitted and received, the offeror may resubmit it in the next fiscal year for consideration for award. Note that an award will not be made from a concept paper. A full proposal must be submitted subsequent to government acceptance of a concept paper.

Points of Contact:

FOR TECHNICAL QUESTIONS

Mailing Address:

Technical Outreach Team
USA Edgewood Chemical Biological Center
ATTN: RDCB-DP-BP-TT
5183 Blackhawk Road
Aberdeen Proving Ground, Maryland 21010-5424

E-Mail: usarmy.APG.ecbc.mbx.technical-outreach@mail.mil

FOR ADMINISTRATIVE/CONTRACT QUESTIONS

Mailing Address:

US Army Contracting Command-Aberdeen Proving
Ground (Edgewood Contracting Division)
ATTN: CCAP-SCE (Brian Mazen)
Bldg. E4215 Austin Road
Aberdeen Proving Ground, MD 21010-5401

E-Mail: brian.e.mazen.civ@mail.mil

2.0 ACRONYMS

AFARS	Army Federal Acquisition Regulation Supplement
BAA	Broad Agency Announcement
BW	Biological Warfare
CB	Chemical and Biological
CBRNE	Chemical, Biological, Radiological, Nuclear and Explosives
CW	Chemical Warfare
DFARS	Defense Federal Acquisition Regulation Supplement
DIS	Distributed Interactive Simulation
DoD	Department of Defense
ECBC	Edgewood Chemical Biological Center
FAR	Federal Acquisition Regulation
HLA	High Level Architecture
HME	Homemade Explosive
IED	Improvised Explosive Device
IR	Infrared
UV	Ultraviolet

3.0 INTRODUCTION

3.1 The U.S. Army Edgewood Chemical Biological Center (ECBC) is the nation's principal research and development resource for non-medical chemical and biological (CB) defense. As a critical national asset in the CB defense community, ECBC supports all phases of the acquisition life-cycle — from basic and applied research through technology development, engineering design, equipment evaluation, product support, sustainment, field operations and demilitarization — to address its customers' unique requirements. Areas of interest include:

- a. BioSciences
- b. Aerosol Technology
- c. Biological Point Detection
- d. Chemical Point Detection
- e. Early Warning and Detection
- f. Smoke and Obscurants
- g. Modeling, Simulation and Analysis for CB, Smoke and Obscurants
- h. Collective Protection Technology
- i. Respiratory Protection Technology
- j. Decontamination
- k. Chemical, Biological, Radiological, Nuclear and Explosive Countermeasures to Terrorism
- l. Flame and Incendiary Technology
- m. Explosives Point, Proximal and Standoff Detection
- n. Chemical Forensics
- o. Surface Science
- p. Analytical Toxicology

3.2 This BAA reflects the ECBC's technical base program. It seeks new and innovative concepts for basic and applied research and for development efforts not related to the development of specific systems or hardware (in accordance with Federal Acquisition Regulation (FAR) 35.016). Offers for research efforts related to specific systems or hardware development will not be considered, except to demonstrate a concept. (Fund types will be RDT&E 6.1, 6.2 and 6.3a.)

4.0 GENERAL INFORMATION

4.1 This BAA is issued under the provisions of FAR 6.102(d)(2) which provides for the competitive selection of offers. Accordingly, offers selected for award are considered to be the result of full and open competition and fully compliant with Public Law 98-369 (Competition in Contracting Act of 1984).

4.2 Although no portion of this BAA has been set-aside for Small Businesses, Small Disadvantaged Business, Historically Black Colleges and Universities and Minority Institutions, their participation is encouraged.

4.3 Offerors should note that this BAA is an expression of interest only and does not commit the government to make any specific number of awards or pay preparation costs generated in response to this announcement. The cost of proposal preparation for responses to a BAA is not considered an allowable direct charge to any resultant contract or any other contract. However, it may be an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18.

4.4 For proposals that have been selected for award, a contract will be prepared for signature by both parties before work begins. Any negotiations that may be necessary will be conducted between the offeror and the Contracting Officer. It should be noted that only a duly appointed Contracting Officer has the authority to enter into a contract on behalf of the government.

4.5 Funding. Awards under this BAA are contingent upon the availability of funds.

4.6 Contractor Registration. The offeror must be registered in the DoD Central Contractor Registration (CCR) database. The CCR allows contractors that are interested in conducting business with the DoD to provide basic information on business capabilities and financial information. To register, visit <http://www.ccr.gov> or call 1-888-227-2423.

4.7 Government-Furnished Facilities and Equipment. It is not uncommon for contracts awarded under a BAA to be performed totally on-site at the ECBC or for building and/or laboratory space to be provided for various aspects of a research project. Therefore, an offeror may be granted permission to use facilities and/or equipment located at the ECBC. In addition, laboratory bench space and/or desk space may also be provided. Permission for use may be granted on a full-time, part-time, or shared basis. Specific types of research facilities and/or equipment available are described in Section 7.0 under the appropriate technical topic. Just as listing facilities and/or equipment does not guarantee it will be available for any particular project, failure to list facilities and/or equipment is not intended to prohibit any proposal from proposing the government provision of same if it is beneficial to the research project or otherwise in the best interests of the government.

4.8 Site Visits. Offerors can visit the ECBC to view the facilities and equipment discussed in paragraph 4.8. If interested, contact the Office of Research and Technology Applications (ORTA), 410-436-4438, e-mail: usarmy.APG.ecbc.mbx.technical-outreach@mail.mil.

4.9 Type of Contract. The type of contract will depend primarily on the proposed technical approach. The government contemplates award of cost (FAR 16.302), cost-plus-fixed-fee (FAR 16.306), or cost sharing (FAR 16.303) contracts under this BAA. For award of a DoD cost type contract or fixed-price contract with progress payments, the offeror shall have a government-approved accounting system that is adequate for determining costs applicable to the contract. However, Firm-fixed-priced (FAR 16.202) and firm-fixed-priced level of effort (term form) (FAR 16.207) contracts are encouraged. The type of contract to be awarded is subject to negotiation with the Contracting Officer.

4.10 Technical Data Rights. The government desires unlimited rights in all data. Therefore, the offeror shall identify any technical data that are subject to delivery to the government with other than unlimited rights. In the absence of such identification, the government will assume that unlimited technical data rights apply and that the information may be freely disclosed at the government's

discretion.

4.11 Restrictive Markings/Proprietary Information

a. The information submitted in response to this BAA may contain technical and other data that the offeror does not want disclosed to the public or used by the government for any purpose other than proposal evaluation. Accordingly, all submissions shall clearly indicate any limitations on the disclosure of the contents. All proprietary data shall be identified and bear an appropriate restrictive legend.

b. If information is provided which constitutes a trade secret, proprietary commercial or financial information, confidential personal information, or data affecting the national security, it will be treated in confidence to the extent permitted by law, provided it is clearly marked. The government assumes no liability for disclosure or use of unmarked data and may use or disclose such data for any purpose.

4.12 Security Requirements

a. Release of Information. Due to increased security concerns, the Contracting Officer's approval is required prior to publication or release of information (i.e., conference papers and presentations).

b. Classified Material. Work in some areas may require the offeror to receive, generate, and store material up to the level of SECRET. This requirement will be handled on a case-by-case basis.

c. Foreign Nationals.

- Helpful Web Sites/References:
 - Federal Election Commission: <http://www.fec.gov>
 - Bureau of Industry and Security: <http://www.bis.doc.gov/>
 - Guidelines for Preparing Export License Applications Involving Foreign Nationals: https://www.bis.doc.gov/index.php/forms-documents/doc_view/709-guidelines-for-foreign-national-license-applications
 - An Inventory of Standards Affecting Security: <http://www.fas.org/sgp/othergov/inventory.html>
 - Title 8, Code of Federal Regulations, Part 274a.2, Verification of employment eligibility: <http://www.ecfr.gov/cgi-bin/text-idx?SID=3c154582d8568c9aa67c75d85a66f78a&mc=true&node=pt8.1.274a&rgn=div5>
 - DOD Instruction 5220.22, National Industrial Security Program: <http://www.dtic.mil/whs/directives/corres/ins1.html>
- A foreign firm shall coordinate with the Administrative point of contact for the BAA listed on page 2 well in advance of proposal submission to ensure there are no restrictions and to allow for coordination with the ECBC Security Office.
- The following groups and individuals are considered foreign nationals: (Obtained from "Foreign National" Website Link above.)
 - Foreign governments;
 - Foreign political parties;
 - Foreign corporations;
 - Foreign associations;
 - Foreign partnerships;
 - Individuals with foreign citizenship; and
 - Immigrants who do not have a "green card."

- Foreign nationals may be approved access to information on unclassified public domain contracts. (Note: Public domain contracts typically include research efforts in the concept refinement phase, e.g., Phase 1 Small Business Innovation Research. Information for these efforts may be released to the public.)
- Employment Eligibility Documentation: Foreign nationals are required to have appropriate documentation IAW Title 8, CFR 274a.2.
- A Foreign National, upon approval by the Contracting Officer, may work on a Government contract under the following conditions:
 - If a university or educational institution proposes to utilize a student during the performance of the contract, the student must have a work Visa and reside in the U.S.
 - The employee proposed by the contractor has a green card (permanent U.S. resident).
 - Receipt of an acceptable background check by the agency.
- To employ foreign nationals, the contractor must comply with the following:
 - International Traffic in Arms Regulation (ITAR)
 - Export Control Act
 - Patriot Act
- Export control requirements may apply:
 - If the foreign national does not reside in the U.S.
 - If work is conducted outside the U.S.
- An export license is not required for Government-furnished information provided to a university or educational institution under the requirements of the contract.
- Foreign nationals working on-site shall not work after normal duty hours (as defined in the contract) or on Government holidays unless authorized Government personnel are present.

4.13 Safety and Occupational Health Information. Offerors shall identify any hazardous materials, to include chemical surety materials, Chemical Warfare (CW) agents, toxins, and biological agents proposed for the effort. Any effort involving microbiological or biosafety work may require a government pre-award inspection of the offeror's facilities. Government approval of the facility is required prior to the conduct of hazardous work. Any proposal involving the use of Bio Hazard Materials must identify in the technical proposal if the contractor has been certified by the Government to perform Bio Level I, II or III work.

4.14 Information and Document Services. Offerors may use the technical reference facilities of the National Technical Information Service, 5301 Shawnee Road, Alexandria, Virginia 22312, to survey existing knowledge and avoid needless duplication of scientific and engineering effort. Bibliographies of technical reports that have resulted from prior DoD funded research and development efforts are available from the Defense Technical Information Center, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, Virginia 22060-6218, telephone (toll free) 800-225-3842. Contact the Technical Outreach Team (usarmy.APG.ecbc.mbx.technical-outreach@mail.mil) for information on obtaining a Defense Technical Information Center account. Copies of technical reports cited in the bibliographies, as well as information about DoD sponsored work currently in progress, can also be obtained from the Defense Technical Information Center. To the extent practical, all other sources should also be consulted for the same purpose.

5.0 CONCEPT PAPERS/PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

5.1 General

- a. A two-part submission process will be used. This procedure is intended to minimize unnecessary effort in proposal preparation and review.
- b. Offerors may submit a concept paper (Part I) for the ECBC's consideration. **No contract awards will be made from a concept paper.**
- c. An offeror whose concept paper has been reviewed and found to be consistent with the intent of this BAA and of interest to the ECBC may be requested by the government to submit a full technical, management, and cost proposal (Part II). **Such a request does not assure that the offeror will be awarded a subsequent contract.**
- d. The government reserves the right to select for award all, some, or none of the concept papers and/or full proposals submitted.
- e. Offerors shall propose up to a 12-month period of performance initially, with up to two (2), 12 month options for the remaining periods of performance, not to exceed a 36-month for the entire period of performance. Unpriced options will not be considered for award. Options shall be priced in accordance with the Announcement requirements.
- f. Classified submissions shall be prepared in accordance with DoD Instruction 5220.22, National Industrial Security Program (<http://www.dtic.mil/whs/directives/corres/pdf/522022p.pdf>).
- g. The offeror shall be required, at a minimum, to submit progress reports. At the conclusion of the contract, the offeror shall be required to submit a final technical report that summarizes the project and associated tasks.
- h. Contractor Representations and Certifications. An offeror whose concept paper has been reviewed and found to be consistent with the intent of this BAA and of interest to the ECBC shall be required to make certain legal commitments through completion of certain representations and certifications and acceptance of government contract clauses and provisions in the contract. The offeror may complete the appropriate representations and certifications at the following web site: <https://orca.bpn.gov/>.
- i. An offeror that proposes the use of foreign nationals during contract performance shall provide the following information and submit with their initial proposal.
 1. Employee's full name;
 2. Date of birth;
 3. Place of birth;
 4. Citizenship;
 4. Registration number;
 5. Type of visa;
 6. Clear copy of picture identification of visa, green card, or permanent resident card;
 7. Port of entry;
 8. Title of position to be filled;
 9. Abbreviated curriculum vitae;
 10. Justification for employment

5.2 Proposals

a. Part I - Concept Paper

(1) The offeror shall submit a concept paper for the ECBC's consideration in advance of a full technical, management, and cost proposal. An ECBC representative will respond to the proposal concept paper with a recommendation. Early submission of proposal concept papers is strongly encouraged. If an offeror wants to submit a concept paper for a different area covered by this BAA, a separate submission must be forwarded.

(2) The offeror shall include a request for any government support needed, if any, (e.g., use of government-furnished facilities and/or equipment located at the ECBC site). The request shall also state whether the need is for a full-time, part-time, or shared basis. Requests will be evaluated as part of the overall evaluation of the proposal and will take into consideration such factors as availability, need, and cost.

(3) Concept papers shall be submitted in the format specified below. All concept papers shall be submitted electronically to: APGR-ECBC Technical Outreach [usarmy.APG.ecbc.mbx.technical-outreach@mail.mil]

(a) Cover Page. The information contained on this page should be unclassified (if possible) and contain no restrictive markings. A completed cover page shall be the first page of the concept paper, be clearly labeled CONCEPT PAPER, and contain the information listed below:

- 1 Control number (Specify BAA ECBC-15)
- 2 Name of organization and address
- 3 Type of business (Large Business, Small Business, etc.)
- 4 Data Universal Numbering System (DUNS) Number
- 5 Commercial and Government Entity (CAGE) Code
- 6 Taxpayer Identification Number (TIN)
- 7 Location where work will be performed
- 8 Applicable topic by BAA paragraph number and title (If an offeror desires to propose on more than one topic it shall submit a separate concept paper for each topic.)
- 9 Title of offeror's proposal (The title should be brief, intelligible to a scientific or technically literate reader, and suitable for use in the public press.)
- 10 Total dollar amount of the proposal
- 11 Type of contract proposed
- 12 Estimated period of Performance (the length of time proposed for performance of the effort should be consistent with the nature and complexity of the proposed research, including time for preparing a final report)
- 13 Performance schedule for each 12-month period of effort proposed.
- 14 Validity Period (allow a minimum of six months from the date of submission)

15 Offeror's Principal Investigator (name, telephone number, facsimile number, and e-mail address)

16 Offeror's Contractual/Administrative Representative (name, telephone number, facsimile number, and e-mail address)

(b) Technical Abstract. The abstract may not exceed 7 pages (including charts, graphs, photographs, etc.). All pages shall be formatted to 8-1/2 by 11 inch page size with type no small than 10 point. The abstract shall include the following:

1. Technical --- A brief technical explanation of the proposed effort that addresses the major concepts and plans to accomplish the technical objectives and the basic approach to be used in the proposed effort. It shall state the background and objectives of the proposed effort, the methods to be employed, and the significance of the proposed effort to the advancement of knowledge in that specific area. It shall also include the nature and extent of the anticipated results and, if known, the manner in which the work will contribute to the accomplishment of the ECBC's mission. If the proposed work involves both basic and applied research, the offeror shall provide a statement indicating approximately what percentage of the work is attributed to basic research and what percentage of the work is attributed to applied research. The technical objectives shall emphasize the proposed effort's innovation and leading edge aspects and its potential for military use or commercialization. The Offeror shall identify any independent research and development work underway which may have direct application. The abstract shall indicate the level of effort to be employed during each period of effort proposed.

2. Management --- A brief management description identifying key personnel who will be involved in the effort, including their qualifications, education, and experience that is related to the effort proposed. Also include the percentage of time to be expended by each person during each period of effort proposed.

3. Cost --- An estimated cost/price (including profit or fee, if any). The offeror shall provide an excel spreadsheet with the following information. The information may be submitted in the offeror's own format.

Direct Materials (specify the types, quantities, and dollar amount)

Material Overhead (specify the rate and dollar amount)

Direct Labor (specify the labor category, the labor rate, the proposed hours, and the dollar amount)

Labor Overhead (specify the rate and dollar amount)

Other Direct Cost

Subcontractors/Consultants (specify organization or name and dollar amount, along with supporting information for proposed materials and travel)

Travel (number of trips, number of personnel, destination(s), mode(s) of travel)

General and Administrative Expense (specify the rate and dollar amount)

Facilities capital cost of money (if applicable)

Profit or fee ((if applicable, specify the rate and dollar amount)

Total Amount Proposed (For proposals involving both basic and applied research the offeror shall provide a general statement indicating how much funding is

attributed to each type of research.)

b. Part II - Full Technical, Management, and Cost Proposal. The offeror's technical, management, cost/price, past performance, and subcontracting (if applicable), sections of the proposal shall be submitted in severable sections as set forth below. All information pertaining to each section shall be confined to the appropriate part. The sections shall be as brief as possible, consistent with complete submission. The government will evaluate the proposal in accordance with the process described in Section IV below.

(1) Section 1 - Technical Section. The offeror is responsible for including sufficient details, without reference to cost/price, to permit a complete and accurate evaluation of the proposal strictly from a technical standpoint. The following information shall be included:

(a) The specific BAA topic area by number and title for which the proposal is being submitted under.

(b) A summary of the objective/purpose of proposed research (i.e., what scientific "problem" do you intend to resolve, advance the state-of -the-art with respect to, or increase the understanding of).

(c) Identification of product(s) or process(es) that the offeror anticipates will result from this effort. Product(s) may simply be technical data, reports on the feasibility of novel concepts, product samples, etc.

(d) Identification of any potential military and/or civilian applications of the product(s) which may be developed if the work performed under the proposed BAA contract is followed through on, following completion of the proposed contract.

(e) An assessment of the probability for project success.

(f) An explanation of the planned approach, techniques, and/or processes to be used in this effort.

(g) Rationale for the proposed methodology. What, if any, innovative ideas/techniques will be tried? Identify the technical risks in completing this project and the approach taken to overcome these risks.

(h) Any planned interactions with ECBC (to include a request for a post-award conference if the contractor so desires) required during the performance of proposed contract.

(i) Any planned collaborative arrangements with other parties (including subcontractors and/or consultants) for the effort. Identify the responsibilities and contributions of these parties in completing the intended deliverables. If the offeror is an academic institution, it should provide details of planned interactions with industry (if applicable) and letters from the industry(ies) stating their commitment to supporting the effort.

(j) A list of the deliverables (technical data, processes, publications, samples, etc.) that will result from the effort plus demonstration of a clear pathway from the research to the intended deliverables. As a minimum, an offeror will be required to submit progress reports (including financial, when appropriate and technical status) and a final technical report. Depending on the duration of the program, offerors may be required to prepare annual interim reports.

(k) A schedule containing milestones for the performance of the proposed effort.

(2) Section 2 - Management Section. This section of the proposal shall include the following for the offeror and any collaborators identified in Part I:

(a) Resumes (or some portion of such) of technical personnel detailing education, experience, and technical expertise proposed for this effort and the percentage of time expected to be devoted to this project.

(b) Organization of the offeror's firm.

(c) Facilities and equipment available for the proposed effort.

(d) Project management systems and controls to be utilized by the contractor.

(3) Section 3 - Cost/Price Section

(a) This section of the proposal shall include an estimated cost/price (including profit or fee, if any). The offeror shall provide an excel spreadsheet with the following information. The information may be submitted in the offeror's own format.

Direct Materials (specify the types, quantities, and dollar amount)

Material Overhead (specify the rate and dollar amount)

Direct Labor (specify the labor category, the labor rate, the proposed hours, and the dollar amount)

Labor Overhead (specify the rate and dollar amount)

Other Direct Cost

Subcontractors/Consultants (specify organization or name and dollar amount, and include a breakout of costs, i.e., labor, travel, materials for each subcontractor/consultant)

Travel

General and Administrative Expense (specify the rate and dollar amount)

Facilities capital cost of money (if applicable)

Profit or fee ((if applicable, specify the rate and dollar amount)

Total Amount Proposed (The offeror shall provide a statement indicating approximately what percentage of the work is attributed to basic research and what percentage of the work is attributed to applied research.)

(b) If requested, the offeror may be required to submit documentation to the Contracting Officer to substantiate costs (e.g., a brief explanation of cost estimates for equipment, materials, and subcontractors/consultants. Sufficient cost/price information is required to allow the government to make a determination of fair and reasonable price and cost realism. For more information about cost proposals and accounting standards see the Defense Contract Audit Agency publication called "Information for Contractors" available at <http://www.dcaa.mil>. Offers predicated upon the establishment of a Cooperative Research and Development Agreement (CRADA) with the Edgewood Chemical Biological Center or other Government agencies as part of their BAA proposal will be rejected.

(c) Cost/Price Realism. A proposal is presumed to represent an offeror's best efforts to respond to the solicitation. Any inconsistency, whether real or apparent, between promised performance and cost/price, should be explained in the proposal. For example, if the intended use of new and innovative production techniques is the basis for an abnormally low estimate, the nature of these

techniques and their impact on cost/price should be explained; or, if a corporate policy decision has been made to absorb a portion of the estimated cost, that should be stated in the proposal. Any significant inconsistency, if unexplained, raises a fundamental issue of the offeror's understanding of the nature and scope of work required and of its financial ability to perform the contract, and may be grounds for rejection of the proposal. The contractor shall supply the government with sufficient information to allow the government to assess the reasonableness of the contractor's costs/prices.

(4) Section 4 - Past Performance Section

(a) Information shall be submitted for all proposed first-tier subcontractors with whom the offeror is teaming, as well as the offeror.

(b) Offeror shall submit past performance information on any contracts (as a prime or subcontractor) they worked on during the previous three (3) years which are relevant to the efforts required by this solicitation. In addition, any and all contracts terminated in whole or part during the previous five years, to include those currently in the process of such termination, are considered relevant and the offeror shall provide past performance information for those contracts. The following information should be included:

- Role as prime or subcontractor
- If from past government contract, the contracting activity, address, and the Procuring Contracting Officer's name, telephone number, facsimile number and email address
- Contract type
- Awarded cost/price
- Final, or projected final, cost/price
- Original delivery schedule
- Final, or projected final, delivery schedule

(c) For each of the contracts described in the past performance section of the offeror's proposal, a description of the objectives achieved, detailing how the effort is similar to the requirements of this solicitation, shall be included. For any contracts that did not/do not meet the original requirements with regard to original cost/price, schedule, or technical performance, the offeror should provide a brief explanation of the reason(s) for such shortcomings and any demonstrated corrective actions taken to avoid recurrence. For any terminated contracts, the offeror shall indicate the termination type and reasons.

(5) Section 5 - Subcontracting Plans (if applicable)

(a) Once proposals are accepted by the technical point of contact and submitted to the Contracting Office for evaluation, the Contracting Officer may decide a subcontracting plan from the offeror is required. This will be dependent upon the contract value and whether or not subcontracting possibilities exist. This requirement shall not apply to small business concerns. Should a subcontracting plan be required, the offeror shall prepare it in accordance with FAR clause 52.219-9 and DFARS clause 252.219-7003 (also, for reference, see Appendix DD, AFARS Part 19.7). During the time period this BAA is in effect the small, small disadvantaged, HUBZone, and woman-owned subcontracting goal percentages may vary. Therefore, should a subcontracting plan be required, the Contracting Officer will establish goals for the offeror at the time one is requested.

(b) As submitted under this BAA, subcontracting plans will be reviewed for adherence to regulations cited in FAR Part 19 and its supplements and not necessarily for evaluation as a specific

evaluation criterion. However, an offeror's refusal to submit a subcontracting plan is grounds for the government not to negotiate award of an offeror's BAA proposal.

6.0 EVALUATION CRITERIA AND SELECTION

6.1 General

a. **Determination of Responsibility.** To be eligible for award, a prospective offeror must meet certain minimum standards pertaining to financial resources, adequacy of accounting systems, prior record of performance, integrity, organization, experience, operational controls, facilities, and conformance with safety and environmental statutes and regulations. Additional information and guidance concerning qualifications and standards for responsibility are contained in FAR, Part 9.

b. Review of a response to this BAA is for peer or scientific review purposes only and in no way constitutes an agreement to enter into any contractual or other relationship. During the government's evaluation, representatives from ECBC (other than a Contracting Officer) may contact an offeror to clarify scientific or administrative issues. No commitment on the part of the government to fund a proposal of an offer, or to support the proposed research, shall be inferred from such discussions. Offerors are cautioned that only a warranted Contracting Officer can obligate the government to the expenditure of funds. Therefore, any offeror that makes financial or personnel commitments for a proposed effort in the absence of an actual contract signed by a warranted Contracting Officer does so at its own risk.

c. All offers will be acknowledged and will be evaluated as they are received. Evaluations will be based on acceptability or non-acceptability without regard to other offers submitted under this BAA. Offers not considered to have sufficient merit or relevance to the ECBC's research program, or those in areas for which funds are not available, will be declined as soon as practical. The government may award more than one contract in a specific area of interest.

6.2 Concept Papers. Each proposal will be evaluated individually by the ECBC's technical staff against the evaluation factors cited in paragraph 6.4 below. Factor 1, Factor 2, and the proposed total cost estimate will be used to determine whether the offer submitted is consistent with the intent of this BAA and of interest to the government. Factor 1 and Factor 2 are of equal importance and each is significantly more important than cost.

6.3 Full Technical, Management, and Cost Proposals. If a full proposal is requested, each offer will be evaluated individually by the ECBC's technical staff and the Contracting Officer against the evaluation factors cited in paragraph 6.4. Factors 1 through 4 are of equal importance and each is more important than Factor 5.

6.4 Evaluation Factors

a. **Factor 1 ---** The overall scientific and/or technical merits of the offer and its relevance to the topic addressed. This includes the approach proposed to accomplish the scientific and technical objective, the merit of the ideas or concepts proposed, the innovativeness of the proposed approach and/or techniques, and pertinent novel ideas in the specific branch of science and technology involved.

b. **Factor 2 ---** Anticipated benefits of the research and its potential value to the DoD and the ECBC's mission.

c. **Factor 3 ---** The adequacy of the offeror's capabilities, related experience, facilities, techniques or unique combinations thereof that are integral to achieving the proposed objective.

d. **Factor 4 ---** The qualifications, experience, and availability of the proposed principal investigator and other key personnel who are critical to the achievement of the proposed objectives.

e. **Factor 5 ---** The reasonableness and realism of the proposed cost and fee/profit.

6.5 Selection. Subsequent selection for contract award of an offer that has been evaluated and determined to be technically acceptable shall be based on the priority of need and availability of funds, as

determined by the Contracting Officer.

7.0 TECHNICAL TOPICS

7.1 Since budgets for DoD are subject to change, the Government has attempted to provide an indication of the likelihood that funding will be available. Any changes to funding priorities will be issued as an amendment to this BAA. Categories are explained below.

Category A This effort has a high probability of funding. It addresses an ECBC program priority.

Category B Funding for this effort is possible.

Category C This effort is an ECBC mission requirement, but is of low priority and funding is doubtful.

7.2 BIOSCIENCES. The ECBC is exploring biotechnology concepts in the areas of detection and decontamination of CB agents, environmental biodegradation and bioremediation, and novel biotic materials. Areas of interest are:

a. Funding Category A - Enzymatic systems for the degradation of chemical nerve agents, mustard and toxins, biological warfare agents and related materials, and investigation of self-decontaminating coatings that have enzymatic or biochemical components. Emphasis is on enzymology, protein chemistry, and molecular biology.

b. Funding Category A - Investigation of microbial systems, biosurfactants and other natural products for the bioremediation of hazardous wastes including chemical agents, their precursors or products, obsolete decontaminants, and other CW related materials. Emphasis is on bioengineering and fermentation.

c. Funding Category B - Nanobiotechnology, principally the rational biomolecular and nano-system design of functional abiotic structures; reconfigurable self-organizing systems; novel nanoparticles; or supramolecular self-assembly; including but not limited to, materials for nanoparticles, nano and meso scale materials fabrication and assembly, and miniaturized devices. Focus is on supporting the Army's zero maintenance efforts and minimizing weight, size, power, and energy requirements.

d. Funding Category B - Next generation reagents including, but not limited to, aptamers, polymers, and peptides with novel binding, catalytic or structural properties. Areas of interest include, but are not limited to, gene libraries, tissue based biosensors, molecular signaling and novel transduction techniques.

e. Funding Category B - Studies on metabolic engineering, optimizing and modeling bioreactor conditions for the scale-up biomanufacture of recombinant and other proteins in bacterial and insect cell systems. The products include, but are not limited to, recombinant antibodies, enzymes, and simulants. Studies may include optimizing feeding strategies, sterilization kinetics, and other bioreactor parameters to increase yield and decrease cost, as well as cryopreservation.

f. Funding Category A - Molecular toxicology with emphasis on gene arrays, specifically the exploitation of recent advances in "panomics"; which refers to genomics, transcriptomics, proteomics and metabolomics, bioinformatics and in vitro approaches such as, but not limited to, cytosensor microphysiometer studies.

NOTE: The following in-house equipment is available for possible use:

- Large-scale fermentors and hollow fiber bioreactors

- Gene array printer
- Analytical (capillary electrophoresis, gas chromatographs, high pressure liquid chromatographs, UV/visible spectrophotometer, microplate reader, total organic carbon analyzer)
- Protein purification (high-speed centrifuges, gel electrophoresis, low pressure chromatograph, high pressure liquid chromatographs, cell disruption systems)
- Molecular biology (automated DNA sequencing and synthesis, polymerase chain reaction, gel electrophoresis)
- Bacterial culture (autoclaves, incubators, incubator shakers, 1 to 1500 liter fermentation systems, centrifuges, cell disruption systems)

7.3 AEROSOL TECHNOLOGY. The objective of the aerosol technology program is to develop advanced aerosol sampling devices needed for detection systems, and to provide the necessary experimental facilities, capabilities (instrumentation and personnel), and methodology to support experimentation with aerosol devices for all ECBC mission and customer programs, emphasizing bioaerosols in the near term. A major effort under this program involves developing the capability to provide quantitative capability to experiment with biosimulant aerosols including controlled generation (size, low concentrations, high rates for high speed wind tunnel studies), quantification, and characterization of laboratory instruments, field experiments, and military devices. The ECBC is interested in innovative concepts to address the following areas of study:

- a. Funding Category B - Effective, Efficient Aerosol Collectors. Theoretical studies of the design and employment of highly biased aerosol collectors intended to collect particles in the 1 to 10 micrometer diameter size range. Fabrication and delivery of such devices which will collect into a small volume of liquid (1 milliliter), or concentrate into a small volume air stream, aerosol particles from 100 to 10,000 liters per minute using little power (nominally 10 to 20 watts) with collection efficiencies exceeding 80% in the 1 to 10 micrometer particle size range. A goal is to minimize the size and weight of the device.
- b. Funding Category C - Method of generating narrowly dispersed aerosols (log standard deviation = 1.5) from slurries or bulk powders. Aerosol mass median diameter selectable over the range of 0.2 microns to 45 microns.
- c. Funding Category B - Investigation of collection efficiency and effects on the viability of biological materials, e.g., *Bacillus atrophaeus* (BG) and *Erwinia herbicola*, when collected from the aerosol state by various collection means to include impaction, vortex scrubbing, electrostatic precipitation, and filtration. Research and investigations to develop technologies for sampling viable microbes from the atmosphere to include processes which consider such factors as relative humidity, repair mechanisms, and other environmental considerations which influence the survival of microbes in the open air. A new device that considers these factors will be expected to have a higher survival rate for microbes and a greater efficiency. These investigations will lead towards a new device for sampling environmental air samples.
- d. Funding Category B - Low energy methods and devices for concentrating suspensions of 1 - 10 micron particles in liquids such as water or phosphate buffered saline from milliliters to microliters with high efficiency for retaining the particles in suspension in the reduced volume.
- e. Funding Category C - Dissemination of bulk powders into the inherent particle sizes found in the feedstock. Dissemination rates of 10 to 250 grams per minute.
- f. Funding Category B - Methods for near real-time field sizing of large polydisperse aerosols (20-500 micron operational range) that are disseminated from high volume aerosol generators such as crop dusters or "leaf blower" type devices.

g. Funding Category C - Aerosol wind tunnel methodologies for creating well-mixed, spatially and temporally uniform challenges of monodisperse inert aerosols and polydisperse biological simulant aerosols for wind speeds up to 80 miles per hour. Aerosol wind tunnel methodologies for creating temporally uniform challenges of monodisperse liquid droplets that can convey inert and biological simulant aerosols for feed rates up to 50 grams/minute.

h. Funding Category B - Design, and/or fabrication, and/or testing of omnidirectional aerosol inlets with aspiration efficiencies greater than 80% for aerosol particles over the aerodynamic diameter size ranges 1 to 10 micrometers (with strong rejection of particles > 10 micrometers) and 1 to 25 micrometers from air flows at wind speeds from 2 to 50 miles per hour. A family of inlets are required covering the internal (aspirated) flow rates from 1 liter per minute to 10,000 liters per minute.

i. Funding Category C - New optical methods for characterizing aerosols for CB detection, smoke development, and field test programs. In particular, the use of Mueller matrix scattering and optical spectroscopic signatures from bacterial cells to correlate changes in biological parameters with changes in scattering pattern and optical methods which can be used as aerosol detectors, such as particle scattering, fluorescence, etc.

j. Funding Category C - Innovative approaches using computational fluid dynamics to describe the external and internal flow around and through vehicles, detectors, sampling ports, buildings, etc., in the open and in wind tunnels (to include analysis of wall effects). The approach or method can use the finite difference or finite element techniques. The description of the flow field should include streamlines, velocity fields, and pressure distributions and allow for modeling of (size-dependent) aerosol particle trajectories.

k. Funding Category C - Methods for laboratory handling, examination, and analysis of single aerosol particles, including spectroscopic methods, and the study of chemical reactions in single particles.

NOTE: Extensive in-house laboratory facilities and equipment are available for possible use, including state-of-the-art aerosol generators, aerosol analyzers, aerosol chambers, and aerosol wind tunnels.

7.4 BIOLOGICAL POINT DETECTION. The ECBC has initiated an effort to investigate commercially available and developmental technologies for the detection and identification of agents of biological origin. This effort will result in automated sensors capable of detecting and identifying these agents in air, food, water or surface samples. Research areas of interest are:

a. Funding Category A - Adaptation of existing commercial macroscale, mesoscale, and microscale biosensor platforms or development of such biosensors to detect and/or identify agents of biological origin in the field. Emphasis is placed on sensors with simple, rapid, reliable assay formats that utilize immunological or DNA/RNA based assay approaches as well as non-immunological or non-DNA/RNA based biosensors using novel/alternative assay approaches.

b. Funding Category B - Assessment, adaptation, or development of immunological based biosensor technologies that provide rapid and simultaneous multiplex and/or multiagent array based detection and identification for agents of biological origin. The main focus is the interrogation and/or development of technologies that meet biodetection requirements for higher throughput, faster immunodetection, and simultaneous analysis of multiple agents with good assay sensitivity while preserving specificity. Candidate systems must be small, lightweight, and user friendly. Assay chemistries should be robust and evaluated for eventual dry down into a simple, single-use reagent format.

c. Funding Category A - Development and evaluation of sample preparation methods for subsequent immunological based analysis, and identification, modification, and assessment of commercial and developmental hardware that is capable of front-end sample clean up and sample

concentration from sample matrices compromised by environmental, animal, or plant substances. Emphasis is to identify and perform separation of bacteria, spores, and toxins from compromising sample matrices using Immunomagnetic Separation (IMS), affinity, and other capture methods. Identify automated approaches and hardware for higher throughput. The methods must be capable of concentrating milliliter to liter volumes down to sub-milliliter to low milliliter amounts, respectively.

d. Funding Category B - Integration, implementation, and validation of analytical instrumentation and procedures for development of robotic based, high-throughput, portable, and automated total analysis biodetection systems (i.e. sample preparation, biodetection, subsystem reset, and decontamination) for use in deployable mobile laboratories or expanded bioanalysis programs. Emphasis is to design the process for sample analysis using immunoassay or PCR based analysis systems.

e. Funding Category B - Development of rapid, automated, lightweight, and portable sensor technologies to be used in the identification of bioagents based on both protein and nucleic acid targets with emphasis on the use of labelless detection and identification approaches, reusable capture substrates and transduction surfaces, and minimal foot print and power.

f. Funding Category B - Development of rapid and automated RNA/DNA detection and identification technologies and assay methods that will allow for both the production of a library of amplified targets from a single set volume of an environmental sample, and the probing of that library for identification of all targets of interest, all in a single analytical method. Current methods using methods such as random hexamers, PCR/RT-PCR, or multiplex assays may be inadequate due to reagent exhaustion prior to completion of the library and its analysis. Standard PCR and RT-PCR would deplete sample volume long before the analysis is complete for all targets of interest.

g. Funding Category A - Development of rapid, automated, and portable technologies to rapidly concentrate and remove interfering substances from liquid environmental bioagent samples, and prepare the targets of interest for nucleic acid analysis. The methods must be capable of concentrating milliliter to liter volumes down to sub-milliliter to low milliliter amounts, respectively; delivering a concentrated amount of nucleic acid material for analysis. Emphasis is on minimizing nucleic acid sheering.

h. Funding Category A - Development and testing of rapid, lightweight, automated, user friendly, and portable biosensor platforms that are capable of performing both nucleic acid and immunoassay based detection and identification of bioagents (i.e. both operations taking place on one sensor). Emphasis is given to approaches that provide simultaneous detection and identification of multiple bioagents (e.g. array based), and simultaneous immunological and nucleic acid based analysis. However, consideration will also be given to systems that perform the two types of assays sequentially as well as sequential detection and identification.

i. Funding Category B - Formulation of either established or new and innovative protocols of bacterial biochemical marker extraction into simple and convenient recipe driven procedures. Limitations on the length of time, number of manipulation steps, use of nonhazardous compounds and solvents, low salt concentration, and the potential for automation must be considered in the proposed approaches.

j. Funding Category A - Development of automated bacterial biomarker extraction devices. The output stream should be amenable to being delivered by analytical sample transfer or introduction systems into analytical detection systems. Weight, size, power and amount of consumable(s) of the proposed microorganism biomarker extraction system(s) should be geared to a minimum. The offeror should also address the fabrication of a system in a number of generations, from first prototype to advanced prototype systems.

k. Funding Category B - Mass spectrometry methods are sought that will allow laboratory and field determinations of the feasibility of mass spectrometry concepts for biological organism detection. .

l. Funding Category B - Development of databases to facilitate detection and identification of bacteria, viruses and toxins.

- m. Funding Category B - Integration of automated bacterial biomarker extraction with electrospray and/or matrix assisted laser desorption ionization mass spectrometers.
- n. Funding Category B - Downsizing mass spectrometry hardware, reducing power requirements, increasing processing speed for rapid detection and identification of biological organisms.
- o. Funding Category A - Conceptualization and validation of alternative means of vaporizing or ionizing biological aerosols without collection on a substrate or probe.
- p. Funding Category C - Development of a database of Raman spectra of biological materials.
- q. Funding Category C - Enhanced concepts of using lasers in CB defense, including, but not limited to: laser desorption, surface catalyzed laser decomposition, surface enhanced laser ionization, and single particle UV fluorescence and mass spectrometric techniques (primarily for the detection of biological materials). Specific interests include enhancement of matrix-assisted laser desorption ionization mass spectrometry through improvements in mass resolution, sensitivity and on-line incorporation of analytical separation techniques.
- r. Funding Category C - The use of small, powerful lasers for use in flow cytometry.
- s. Funding Category C - The development of new dyes, immunoassay reagents, nucleic acid probe reagents, etc., for the enumeration of bacterial properties. Ideally these materials should be excitable with red diode lasers, although dyes excited with argon ion or other lasers are also of interest.
- t. Funding Category C - Simple bioluminescence/chemiluminescence equipment.
- u. Funding Category C - Development of improved data processing techniques in flow cytometry, such as neural nets, expert systems, etc.
- v. Funding Category C - Investigations into the mechanisms of biological aerosols, such as factors affecting viability and culturability; preservation of activity; and effects of particle sizes on viability.
- w. Funding Category A - Fusion of generic detection capabilities, such as particle size analyzers, elemental analysis, or organic composition with computer algorithms to effect a smarter detection capability.
- x. Funding Category A - Investigations into virus detection techniques.
- y. Funding Category A - Simple, rapid tests for the determination of sugars, proteins, nucleic acids, etc.

NOTE: Use of ECBC instrumentation (on an availability basis) and flow cytometers may be granted.

z. Funding Category C - Collection and organization of current and historical biological reports and other literature for inclusion in the Biological Defense Encyclopedia. This effort will include the location of literature and reports and the electronic processing of these papers and images for addition to an existing database. This effort will be wide reaching in scope and will seek to include all available information on the historical, physical, and detailed microbiological information regarding microbes considered of use in BW. One use of this database is assistance to defensive models and research governing the detection of microbes in the environment.

aa. Funding Category B - Remote, stand-alone systems are needed that are capable of triggering for the presence of biological compounds and microorganisms. Pyrolysis gas chromatography-ion mobility spectrometry (Py-GC-IMS) and Pyrolysis-gas chromatography-small mass spectrometry (Py-GC-MS) are candidate systems because of their relatively small size and logistics. The system can also

provide information for specific pyrolyzate compounds from biological material. Technologies must demonstrate short duty cycle times; a logistically efficient, low power burden aerosol collector; efficient transfer of pyrolysis products to the ion mobility spectrometry detector; and distinct gas chromatography/ion mobility spectrometry dataspace domains corresponding to established compounds found in microorganism and protein biological compounds.

NOTE: The following in-house equipment is available for possible use for the remote, stand-alone systems:

- Py-GC-IMS briefcase platform
- 200 C/min and 6000 C/min Thermogravimetry (TGA)-GC-MS systems
- Py-GC-parallel IMS- time of flight MS

bb. Funding Category B - Algorithm for generating mass spectrometric libraries for protein toxins, bacteria and viral particles; search routines for automated comparison of sample and standard mass spectrometry spectra and automated identification of biological agents.

cc. Funding Category A - Studies to expand and analyze data bases of ambient biological aerosol background, to include particle counting and sizing, enumeration of major microbial constituents, quantification of biological loading in the ambient atmosphere, and correlation of these characteristics with meteorological conditions, season, diurnal period, etc.

dd. Funding Category B - Optical Trigger Technology. Spectroscopic interrogation and analysis of aerosol particles for peculiar signatures "fingerprints" that facilitate rapid screening and continuous monitoring of ambient air for the likelihood of a BW agent event. The purpose of the trigger is to provide adequate early warning to friendly forces and cue a collection and assay system for confirmation and identification of the biological threat.

7.5 CHEMICAL POINT DETECTION

a. Funding Category B - Lightweight Detection. The ECBC has initiated an effort to investigate technologies with potential for detection and identification of Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) hazards using small, lightweight, modular devices. This effort will result in development of devices capable of detection of less than incapacitating levels of agents in real-time where real-time is defined as a few seconds. Devices must also be able to recover from an exposure in a similar amount of time. Technologies must demonstrate potential for development into devices with the following desirable characteristics: fit into shirt pockets of battle dress uniforms, weigh less than two pounds, and consume less than two watts of electrical power. Technologies must also demonstrate potential for exhibiting ultra-sensitivity properties, defined as miosis levels of CW agent poisoning, within a few minutes using minimal electrical power. It is also desirable that ultra-sensitivity properties result from addition of a small, lightweight modular form of sensitivity enhancement onto the real-time detection device.

b. Mass Spectrometry. The ECBC is interested in innovative concepts in the following areas, all related to the potential use of mass spectrometry to detect, identify and quantify chemical and explosive hazards:

(1) Funding Category B - Design of a mass analyzer and efficient algorithms for rapid analysis of mass spectra of CB agents.

(2) Funding Category B - Incorporation of artificial intelligence techniques for optimization of spectrometers for the detection of CBRNE hazards.

NOTE: In-house development environments available for possible use include Matlab, Mathematica, PC-Based Expert Systems technology, as well as conventional non-artificial intelligence computer languages. Extensive laboratory computing facilities, including

multiprocessor mini-supercomputers, are also available.

c. Funding Category B - Investigation of the application of fluorescence, Raman, infrared, and terahertz spectroscopy for the detection of chemicals on natural and man-made surfaces.

d. Funding Category B - There is a need for a remote stand-alone detector to trigger and/or detect CB species. Candidate components of ion mobility spectrometry-based methods include:

(1) Hydrophilic and hydrophobic solvent extraction techniques for relatively large biological substances from bacteria.

(2) On-line filtration so as to remove salts and signal suppression compounds.

(3) Liquid-based techniques for the separation of biological compounds within a molecular weight range.

(4) Electrospray ionization in order to efficiently transfer the biological compounds into an ion mobility spectrometer.

(5) Data analysis techniques and ion mobility spectrometer tandem mass spectrometry to correlate the observed signal with known biomarkers.

The system shall also produce information from chemical agents in aqueous solution at concentrations less than parts-per-million levels. The sensitivity goal is low parts-per-billion. Both BW and CW information production from the electrospray ionization ion mobility spectrometer system shall display high sensitivity, low liquid expendable logistics and efficient clearing of the ion mobility spectrometer detector.

e. Funding Category B - Development and/or modification of new or existing methodologies for the detection and identification of low levels of both chemical and biological hazards in water sources.

7.6 EARLY WARNING AND DETECTION. The ECBC has initiated an effort to investigate commercially available and developmental technologies for early warning, detection and identification of chemical, biological, radiological, nuclear and explosive hazards. This effort will result in automated sensors capable of detecting and identifying these agents in air, food and water or surface samples. This effort will focus on standoff technologies where a sensor is physically separated from the CBRNE hazards by some distance. Research areas of interest are:

a. Funding Category B - Adaptation of existing standoff sensors or development of novel standoff sensors to detect, identify, and/or quantify chemical, biological, radiological, nuclear and explosive (CBRNE) hazards in the field. Emphasis is placed on optical sensors that provide sensing at a distance and provide detection and reconnaissance over a wide area of a possible battlefield. However, other techniques such as acoustical sensing will be examined also.

b. Funding Category B - Investigation of new and novel spectroscopic techniques for proximal and/or standoff detection, identification, and/or quantification of CBRNE hazards. All regions of the electromagnetic spectrum, from radio waves to γ -rays, will be explored. New spectral methods for the discrimination of CBRNE hazards from possible interferents, i.e. methods that increase detection sensitivity while reducing false alarms, are sought. Both active and passive technologies will be explored.

c. Funding Category B - New methods for wide area detection are sought. Wide area detection requires the simultaneous monitoring of large areas of a battlefield for CBRNE hazards.

d. Funding Category B - New and novel signal processing for standoff CBRNE detection is being sought. Sensor integration will also be examined.

e. Funding Category B - New excitation sources for standoff detection will be examined. New laser sources for CBRNE detection are being sought. Better sources in other regions of the electromagnetic spectrum, such as the deep ultra-violet, far infrared and millimeter wave regions, are also being sought.

f. Funding Category B - New methods for detection-on-the-move are sought. Placing a standoff sensor of a moving platform requires care. This effort will focus on developing sensors that are rugged and can operate rapidly such that movement of the vehicle does not blur the signal from the sensor.

g. Funding Category B - New methods are sought for standoff detection of aerosols.

h. Funding Category B - New methods are sought for standoff detection of contaminants on surfaces, both natural and manmade.

7.7 SMOKE AND OBSCURANTS The objective of the smoke program is to develop materials and demonstrate weaponization feasibility to provide full spectrum screening (as required) to defeat or degrade threat target acquisition, ranging and marking, tracking, anti-tank guided missiles, and directed energy weapon systems. A major effort under this program involves developing the capability to provide effective obscuration in the UV, visible, IR, and microwave regions of the electromagnetic spectrum. Combinations of these four regions (multi-spectral) are also of interest. The ECBC is interested in innovative concepts to address the following areas of study:

a. Funding Category B - High yield visual, IR and microwave obscurants on the battlefield.

b. Funding Category B - Dispersion technology for nanoparticles (conductive flakes and fibers).

c. Funding Category B - Improved screening material packaging, compaction, feed, and deagglomeration technologies.

d. Funding Category B - Visual, IR and microwave obscurants that are environmentally safer and/or less toxic than current materials.

e. Funding Category C - Identification of candidate multiband screening material.

f. Funding Category C - Improved dissemination of materials.

g. Funding Category C - Improved ballistic stability of non-solid payloads.

h. Funding Category C - Techniques to measure screening effectiveness and obscurant generating equipment effectiveness.

i. Funding Category C - Aerosolization of obscurant materials.

j. Funding Category C - Effects of smokes and obscurants on the battlefield.

k. Funding Category C - Vulnerability analysis of threat sensor systems versus obscurants.

l. Additional Requirements. Innovative concepts are requested to address requirements for the following future obscurant systems:

(1) Funding Category B - Nanoparticle obscurant candidates (ultrathin conductive flakes or submicron-diameter conductive fibers that can be aerosolized)

(2) Funding Category C - Degradable smokes, i.e., a limited life obscurant that does not interfere with future battlefield operations.

(3) Funding Category C - Robotic delivered smokes.

(4) Funding Category C - Smoke clearing concepts.

(5) Funding Category C - JP-8, the single fuel to be used in future battlefield operations, does not produce an effective smoke screen in the Vehicle Engine Exhaust Smoke System. Improved duration and persistence of JP-8 smoke is needed.

(6) Funding Category B - Spectrally-selective obscurants.

NOTE: Facilities at ECBC that are available for possible use include:

- A 190 cubic meter aerosol chamber for analyzing small obscurant samples (10 to 100 grams). It is equipped with instrumentation for measuring transmission for the range 200 nanometers to 15 centimeters (UV to microwave). Concentration of the aerosol can be measured for calculating extinction coefficient. Various dissemination devices are available.

- A breeze tunnel for testing particulate disseminators up to full- scale generators. It has a 14-foot by 14-foot cross-section, a 100,000 cubic feet per minute flow rate and a 5-mile per hour wind speed. It has laser and background action required radar transmissometers (.63 microns, 10.6 microns, 35 gigahertz, 94 gigahertz) for evaluating dissemination efficiency. It has the capability to take samples of the obscurant.

7.8 MODELING, SIMULATION, AND ANALYSIS FOR CB, SMOKE AND OBSCURANTS. The objective of this program is to design, develop, validate and utilize analytical and computer modeling and simulation tools to analyze CB agent and smoke/ obscurant cloud transport and diffusion; agent deposition; performance of CB defense equipment; and performance degradation effects on personnel and equipment due to CB agents and smoke/obscurants. The program is oriented to constructive and virtual implementations in the DIS and HLA environments. The program is supported by the following tasks:

- a. Funding Category C - Characterize the CB/smoke warfare environment for support of CB defensive equipment research, development and acquisition including test and evaluation. Of special interest is constructive and virtual DIS/HLA environments as relates to effects on performance of personnel and CB defense equipment.

- b. Funding Category C - Characterize the performance of CB/smoke defensive equipment in a contaminated environment. Of special interest are point and standoff detectors, individual and collective protective gear, decontamination processes, warning and reporting systems, and command and control processes in a DIS/HLA environment.

- c. Funding Category C - Characterize the fate of CB agents deposited on surfaces such as soil, water, foliage, metal, roadways, runways, ships, buildings, military equipment, and electronic devices.

- d. Funding Category C - Characterize and validate CB and smoke/ obscurant cloud transport and diffusion under conditions of variable meteorological conditions, terrain formations, around and within various types of buildings and structures in urban and military locations. Work should be specifically oriented toward the DIS/HLA environment and be interoperable with existing ECBC DIS simulations and simulators like the Chemical, Biological, and Radiological Simulator.

- e. Funding Category C - Characterize the effectiveness of smoke and obscurants for development, training and operations as well as for countermeasures to smart weapons with emphasis on DIS/HLA.

- f. Funding Category C- For all of the above areas of research, assist in the archiving, retrieval and analysis of historical data for the generation of model algorithms and determination of improved model

input parameters. Key aspect is the publishing of the historical data in formats or databases that are widely accessible both within ECBC and external organizations.

7.9 COLLECTIVE PROTECTION. The objective of the collective protection program is to develop new and improved concepts, methods and materials for collective protective systems to guard against all potential threat agents. Future collective protection will be modular in design with lower power, weight and size requirements and longer operational life. Future systems will be integrated with the host's environmental control unit and/or auxiliary power unit. Current efforts involve developing new concepts and improved materials and processes for enhancing and/or providing an alternative to present impregnated activated carbon based collective protection systems. Emphasis will be on greatly extended operational life and reduced logistics burden. Current concepts being considered include, but are not limited to: regenerative filtration using pressure swing adsorption; temperature swing adsorption; a new improved sorbent technology; membrane technology; and, new and improved canisters and filtration media. With this in mind, the ECBC is interested in the following innovations:

a. Funding Category B - Concepts for studying the vapor adsorption properties of standard ASZM-TEDA (chromium free) carbon and of developmental fixed-bed adsorptive reactive media and processes such as pressure and temperature swing adsorption, membrane separation, and catalytic oxidation.

NOTE: The following equipment is available for use under this area of interest:

- Surface analysis instrumentation
- CATOX reactor/data acquisition systems
- Lab-scale pressure swing adsorption (PSA) reactor/data acquisition systems
- Adsorption equilibrium measurement systems

b. Funding Category A - New air purification technologies that provide enhanced CB removal capability with low power requirements while also offering the advantages of small size and low weight.

c. Funding Category A - New aerosol filtration technologies that provide improvements in the following areas over that provided by filters based on high efficiency particulate air grade media:

- (1) Increased filtration efficiency
- (2) Lower pressure drop
- (3) Reduced clogging

d. Funding Category A - New adsorbent technology applicable as a substrate for impregnation for use in current reactive adsorber systems or as an adsorbent for use in pressure swing adsorption or temperature swing adsorption systems.

e. Funding Category A - New reactive impregnant technology that provides increased chemical warfare agent removal for application on an adsorbent substrate (either carbonaceous or noncarbonaceous).

f. Funding Category B - Improvements to current filter and ancillary equipment designs (both for collective protection and for use on respirators) to provide benefits in performance, physical characteristics and/or costs (item and operational).

g. Funding Category C - Improvements to equipment that permits safe and rapid entry and exit to or from collective protection shelters.

7.10 RESPIRATORY PROTECTION. The main objective of the respiratory protection program is to develop new and improved concepts, test methods, and materials for respiratory protective systems to guard against all potential CBRN threat agents while minimizing the impact on mission performance. Future respiratory protection will be modular in design with lower profile and weight requirements to improve equipment compatibility and reduce the physiological burden and discomfort often associated with respirator wear. Current efforts involve developing novel integrated CBRN-protective mask and headgear (i.e., helmet) concepts that provide enhanced respiratory protection, comfort, and compatibility with heads-up displays, communication equipment, weapon sighting systems, and other individual protective clothing and equipment worn by the warfighter. Innovative air-management systems, real-time mask fit indicators, seal designs, and other technologies are being sought that offer significant advances in the protection, fit, operational performance, and comfort of the mask system. In addition, the ECBC is interested in enhancing its facilities and methodologies needed to support experimentation with next generation respiratory protective devices for all mission and customer programs. Research areas of interest include:

- a. Funding Category B: Development and demonstration of closed-circuit self-contained breathing apparatus concepts and test bed systems, including hybrid systems consisting of powered air purification. Investigation of associated technology for weight and heat reduction and improvements in efficiency.
- b. Funding Category B: Design and fabrication of integrated respiratory protection headgear concepts and test bed systems. Development of new and innovative integration approaches, attachment systems, and sealing systems.
- c. Funding Category B: Fabrication of respiratory protection prototypes for operational demonstration. Application of rapid prototype and manufacturing technology to fabricate robust and functional prototype models.
- d. Funding Category B: Investigation of nano-scale material solutions for respiratory protection. Exploration of material and coating technology to enhance CBRN protection, lens fogging resistance and seal performance.
- e. Funding Category B: Investigation of microelectromechanical solutions (i.e., MEMS technology) for respiratory protection. Exploration of novel MEMS and other smart technology solutions for breathing assist, cooling, sealing systems, and other respirator operational parameters of interest.
- f. Funding Category C: Assessment of concurrent CBRN PPE wear on ballistic PPE effectiveness. This effort will initially assess the applicability of current ballistic helmet standards to evaluate concurrent CBRN PPE usage. Develop new or improve existing test methodologies and obtain data to assess the effect of concurrent wear on all parameters of ballistic helmet performance (e.g. stability, shock, and surface coverage).
- g. Funding Category C: Develop new or improve existing unmanned test systems, test equipment, test methods and procedures for human factors assessment of respiratory protective masks including, but not limited to, field of vision, eye relief, fogging, breathing resistance, speech, hearing, and sweating.
- h. Funding Category A: Scale metal-organic frameworks to kilogram and above quantities. Develop flow-through and/or solvent recycle systems to increase yield and drastically reduce cost compared to current methods. Reduce the need for organic solvents. Develop techniques for supramolecular engineering of large mesh metal-organic frameworks through strategies such as binding and polymerization. Focus should be on metal-organic frameworks with military utility. These materials can be used for applications such respiratory protection, filtration, suits, decontamination, etc.

7.11 DECONTAMINATION – An objective of this program is to understand, develop, mature, or otherwise advance decontaminant technologies and approaches through the characterization of contaminant-material-decontaminant-environmental interactions.

- a. Funding Category B - Development and demonstration of novel decontaminant formulations for chemical and biological decontamination.
- b. Funding Category B - Modeling and Simulation tools and techniques as applied to Decontamination Sciences: design, develop, validate and utilize analytical and computer modeling and simulation tools to analyze/characterize contaminant, material, decontaminant, environmental interactions.
- c. Funding Category B - Demonstration of dual use technology with application to chemical/biological agent decontamination and routine cleaning/maintenance activities.
- d. Funding Category B - Analytical tools and techniques to advance the characterization of contaminant, material, decontaminant, environmental interactions.
- e. Funding Category B - Development and demonstration of coatings/surfaces with enhanced resistance and/or inherent reactivity toward chemical contamination.
- f. Funding Category B - Application and optimization of novel solids for sorbent/surface decontamination.
- g. Funding Category B - Application and optimization of vapor/gaseous decontaminants for chemical and biological agents.
- h. Funding Category B - Innovative technologies are sought to support development for the sensitive equipment decontamination (SED) program. Technologies are needed to decontaminate (safe removal and/or destruction) chemical and biological warfare agents from sensitive equipment and vehicle interiors without adversely affecting the function of the equipment and/or interior components. The SED program is currently seeking technologies/processes for two capability segments. The first is the decontamination of vehicle, ship and aircraft interiors. The second capability is to decontaminate vehicle, ship, aircraft interiors and associated cargo during operation. These technologies or systems are needed to meet one or both capability segments.

7.12 CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR AND EXPLOSIVES COUNTERMEASURES TO TERRORISM

Funding Category A - The ECBC is seeking proposals for novel research to assist in the war against terrorism. This is a broad research area, and proposals topics include (but are not limited to): biological and chemical countermeasures, CBRNE sensor and detector development, rapid methods of CBRNE detection, new and advanced decontamination techniques, new physical and protective countermeasures, technology enhancements for first responders, advances in hospital response, chemical and biochemical agonists and blocking agents, advanced biotechnological methods, rapid diagnostic methods, new CB training and communication procedures and CB modeling and simulation methods.

7.13 FLAME AND INCENDIARY TECHNOLOGY

Funding Category B - The ECBC is seeking proposals for novel research in flame and incendiary technology. This is a broad research area, and proposal topics include (and are not limited to) enhanced reactive materials, thermally enhanced hydrocarbons, pyrophorics, hypergolics, intermetallics, thermobarics and thermite/thermates. The applications of these and other technologies may be uniquely

delivered to enhance lethality of personnel and materiel targets. Such targets and situations include (and are not limited to) military operations in urban terrain, operations other than war, enhanced lethality to traditional materiel (e.g. vehicles) and fuel targets. Such delivery concepts include (and are not limited to) shoulder-launched systems, projectiles and grenades.

7.14 EXPLOSIVES POINT, PROXIMAL AND STANDOFF DETECTION. (Also see Paragraph 7.6 Early Warning and Detection)

- a. Funding Category A – The development and understanding of signatures and algorithms required to provide improved point, proximity, and standoff detection of explosives, homemade explosives and precursor materials to enable the warfighter to integrate chemical and explosive hazard detection equipment.
- b. Funding Category A – The collection and analysis of alternative chemical signatures and algorithms that will improve the probability of detection of an explosive hazard or HME manufacturing/assembly location. Additionally, signatures based phenomenology to improve point and stand-off detection of explosives and precursor materials
- c. Funding Category A - Development of and integration into existing point, proximal and stand-off detection systems for explosives and homemade explosive precursor materials.
- d. Funding Category A – Forensics analytical methods for military explosives, homemade explosives (HME), HME precursors, and residue analysis for attribution. (See Paragraph 7.16)

7.15 CHEMICAL FORENSICS. Forensic science is a multidisciplinary subject used for examining crime scenes and gathering evidence to be used in prosecution of offenders in a court of law. Forensic science techniques are also used to examine compliance with international agreements regarding weapons of mass destruction and counter-IED operations.

- a. Funding Category A – Chemical Forensics for WMD attribution. ECBC is interested in a growing area of forensic analysis for monitoring non-proliferation of weapons of mass destruction, analysis of possible terrorist attacks or breaches of security. The nature of samples analyzed is wide, but slightly different to a criminal investigation. Novel and new methods of sample collection and forensic analysis from objects, water, and plant material to test for the presence of radioactive isotopes, toxins, poisons, biological agents, and chemicals that can be used in the production of chemical weapons or homemade explosives.
- b. Funding Category A – Novel Instrumentation. A number of orthogonal analytical methods are needed for forensic laboratories to analyze evidence. These methods vary and may not be appropriate for use in a combat environment by soldiers not performing a law enforcement mission. Many of these forward deployed teams rely on portable instruments. While these can perform rapid forensic analysis in the field, they are often limited in their capabilities, and have elevated false positive rates when compared to results from a fixed forensic laboratory. Instruments are needed for chemical analysis in austere laboratory or field conditions that provide reliable and complete chemical composition information. Additionally, new laboratory instruments are needed to identify nearly every element present in a sample.

7.16 SURFACE SCIENCE

- a. Funding Category A: specifically the characterization of chemical and biochemical phenomena occurring at or near solid surfaces and interfaces, the interactions between chemical reactions and transport processes on surfaces.
- b. Funding Category A – Mass Transport in Complex Systems; specifically the development of greater understanding of the complex behavior of mass transport in microporous systems with protection and nanotechnological applications.
- c. Funding Category A: Theory and Modeling: Model analysis can provide a more idealistic understanding of relevant structures, guide experimental efforts and help choose or design

the best characterization tools. Better computational tools are needed for surface and interfacial modeling in order to understand the precise structural or chemical properties of materials. Specifically, ECBC is seeking the use of modeling tools to explore distinct surface/structural properties; to understand trends in interfacial energy with different hetero atom groups (S,N,O...); and interactions with guest or sorbate molecules.

- d. Funding Category B: Synthesis: the synthesis and characterization of catalysts that function at the nanoscale.

7.17 ANALYTICAL TOXICOLOGY

- a. Funding Category B: Biomarker Discovery; determination of novel biomarkers of CW agent exposure.
- b. Funding Category C: Tissue Imaging; development of mass spectrometry based tissue imaging techniques for CW agent exposure studies.
- c. Funding Category B: Antibody Production; development and production of butyrylcholinesterase antibodies for animal species that can be used for immunoprecipitation.
- d. Funding Category C: Materials Toxicity Assessment; development of assays that will examine the toxicity of materials both pre and post contamination with CW agent.
- e. Funding Category C: Synthesis; the synthesis and characterization of standards for the analysis of amino acids or short chain peptide fragments with a CW agent moiety.